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10/790,093	03/02/2004	Robert Scott Winsor	0918.0269C	1178

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EXAMINER	
WANG, QUAN ZHEN	

ART UNIT	PAPER NUMBER
2613	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/790,093	WINSOR, ROBERT SCOTT	
	Examiner	Art Unit	
	Quan-Zhen Wang	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-15,18-36,39,40,44-47 and 52* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-15,18-36,39,40,44-47 and 52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 3-15, 20-37, 44-47, and 52 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1, 24, 44, 47, and 52 recite the limitation of "at a data rate that is no less than one Gb/s". However, nowhere does the specification as it is originally filed support the cited limitation. Therefore, the cited limitation is considered as new matter.

Applicant claims that the support for the newly added limitation can be found at page 7, line 21 to page 8, line 17 and at page 9, line 12 to page 10, line 12. However, the specification simply shows that "free space optical communication at 2.5 Gbps for link distance in excess of 350 km may be achieved"; and "free space optical communication at 10 Gbps for link distance of approximately 90 km may be achieved". As it can be seen that the specification discloses the theoretical limits on the data rate. It does not specifically disclose that the data transmission is "at a data rate that is no less than one Gb/s", as it is claimed.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 18-19 and 39-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 18 and 19 both depend on claim 16. However, claim 16 is canceled. There is insufficient antecedent basis for claims 18 and 19.

Claims 39 and 40 both depend on claim 37. However, claim 37 is canceled. There is insufficient antecedent basis for claims 39 and 40.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 3-10, 12-15, 19-31, 33-36, 40, and 44-47, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doucet et al. (U.S. Patent US 5,786,923) in view of Koyama et al. (F. Koyama et al., "1.5 W operation of superluminescent diode with highly strained GaInAs/GaAs quantum well emitting at 1.2 μm band"; IEEE 17th International Semiconductor Laser Conference Digest 2000, September 2000, Pages 71 – 72) and further in view of Amadon et al. (U.S. Patent US 6,867,889 B1).

Regarding claims 1, 24, 44, and 47, and 52, Doucet teaches a method for light transmit across a free space (fig. 1, 100), the method comprising: generate a substantially phase incoherent beam of light (column 4, lines 52-56); collimating the phase incoherent beam of light (fig. 8, optical antenna 710); externally modulating the beam of light (fig. 8, beam modulator 752); and propagating the phase incoherent collimated beam of light across the free space (fig. 8, to/from optical router unit). The system of Doucet differs from the claimed invention in that Doucet does not specifically teach that the light source for the incoherent light beam is a single LED coupled to a single mode fiber to produce incoherent beam of light having narrow spectral range. However, it is well known in the art to generate incoherent light beam using a LED coupled to a single mode fiber. For example, Koyama discloses a light source that can be used for free space optical communication comprising a single LED coupled to a single mode fiber (fig. 1; paragraphs 1-3) to produce incoherent beam of light having narrow spectral range (fig. 3, emission spectra. Note that the spectral range is narrower than 40nm). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a single LED coupled to a single mode fiber, as it is taught by Koyama, into the system of Doucet as the light source in order to provide phase incoherent light beam having narrow spectral range (spectral range narrower than 40nm). The modified system of Doucet and Koyama inherently reduces atmospheric scintillation when transmitted across the free space and optimizes energy efficiency of the light transmission because the light source is incoherent. The modified system of Doucet and Koyama differs from the claimed invention in that

Doucet and Koyama do not specifically disclose the limitation of the data rate is no less than one Gb/s. However, the limitation only recites an intended use of the system, it does not help to differentiate the claims from the prior arts in terms of structure. In addition, it is well known in the art that data rate greater than 1 Gbps is used for free space optical communication. For example, Amadon discloses to use a data rate that is greater than 1 Gbps for free space communication (column 2, line 60 to column 3, line 2). Furthermore, Amadon specifically discloses that the light source is not limited to being being monochromatic or to any particular wavelength or color, and may include visible light as well as ultraviolet or infrared portions of the spectrum. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to configure the modified free space optical communication system of Doucet and Koyama to transmit data at rate no less than one Gb/s, as it is disclosed by Amadon, in order to increase the data transmission bandwidth. As to claim 44, Koyama further discloses that the superluminescent light emitting diode can be connected to a single mode fiber. As to claim 47, Doucet further teaches modulating (fig. 8, beam modulator 752) the beam of light (fig. 8, light source 754) with data to be transmitted from source to a destination across the free space, and the distance can obviously be of at least one kilometer.

Regarding claims 3-5 and 25-27, the modified system of Doucet and Koyama differs from the claimed invention in that Doucet and Koyama do not specifically teach that the system includes various claimed methods of generating incoherent beams of lights. However, the examiner takes Official Notice that the methods of generating

incoherent beams of lights in claims 3-5 and 25-27 are well known light generating methods in the art. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate any of the methods in claims 3-5 and 25-27 into the modified system of Doucet and Koyama as the light source of the system, wherein the claimed differences involved to the substitution of interchangeable or replaceable equivalents and the reason for the selection of one equivalent for another was not to solve an existent problem, such substitution has been judicially determined to have been obvious. *In re Ruff, 118, USPQ, 343 (CCPA 1958).*

Regarding claims 6-7 and 28-29, the modified system of Doucet and Koyama differs from the claimed invention in that Doucet and Koyama do not specifically teach that the system includes a light amplifier for amplifying the incoherent beam. However, the examiner takes Official Notice that amplifying incoherent light using a light amplifier, such as an Erbium doped fiber amplifier, is well known in the art. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a light amplifier, such as an Erbium doped fiber amplifier, in the modified system of Doucet and Koyama in order to amplify the incoherent beam.

Regarding claims 9-10 and 30-31, the modified system of Doucet and Koyama differs from the claimed invention in that Doucet and Koyama do not specifically teach that the system includes filtering the incoherent beam to reduce the bandwidth of wavelength spectrum, or bandwidth limiting the incoherent beam into a plurality of bandwidth channels. However, the examiner takes Official Notice that is well known in the art to filter an incoherent beam to reduce the bandwidth of wavelength spectrum, or

to limit bandwidth of an incoherent beam to form a plurality of bandwidth channels. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate filters in the modified system of Doucet and Koyama in order to filter the incoherent beam to reduce the bandwidth of wavelength spectrum, or to limit bandwidth of the incoherent beam to form a plurality of bandwidth channels.

Regarding claims 12 and 33, Doucet further teaches that the system includes collimating the beam of light with one of a conventional optical mirror (fig. 8, optical antenna 710).

Regarding claim 13, Doucet further teaches focusing the beam of light onto a primary focal plane of a telescope (fig. 8, lens 780).

Regarding claim 14, Doucet further teaches directing the optical beam towards an optical receiver using active pointing techniques (fig. 8, active optical control system 760).

Regarding claims 15 and 36, Doucet further teaches directing the optical beam towards an optical receiver using static pointing techniques (column 17, lines 39-48).

Regarding claims 19, and 40, as they are under stood in view of the above 112 problems, Doucet further teaches to modulate WDM channels within the beam of light (column 8, lines 13-20).

Regarding claim 20, Doucet further teaches to receive the incoherent beam from free space (fig. 8, signals to/from optical router).

Regarding claim 21, Doucet further teaches tracking the receiving beam of light using active pointing and tracking techniques (column 17, lines 49-54).

Regarding claims 22-23, Doucet further teaches to detect one of light and darkness within the received beam of light (inherent), thereby to produce a received data stream and demodulate the received data stream (fig. 8, Beam demodulator 772 and receiver 770).

Regarding claim 34, Doucet further teaches that the propagating optics is a telescope (fig. 8, optical antenna 710).

Regarding claim 35, Doucet further teaches that the propagating optics further includes an active pointing and tracking module to control the direction in which the incoherent beam is propagated (fig. 8, beam alignment detector 762 and active optics control system 760).

Regarding claim 45, Doucet further teaches that the system comprising a propagating optics to propagate the phase incoherent collimated beam of light across the free space (fig. 8, optical antenna 710).

Regarding claim 46, Doucet further teaches that the propagating optics further includes an active pointing and tracking module to control the direction in which the incoherent beam is propagated (fig. 8, beam alignment detector 762 and active optics control system 760).

7. Claims 11 and 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Doucet et al. (U.S. Patent US 5,786,923) in view of in view of Koyama et al. (F. Koyama

et al., "1.5 W operation of superluminescent diode with highly strained GaInAs/GaAs quantum well emitting at 1.2 μm band"; IEEE 17th International Semiconductor Laser Conference Digest 2000, September 2000, Pages 71 – 72)and Amadon et al. (U.S. Patent US 6,867,889 B1) and further in view of Meadows (U.S. Patent US 5,381,250).

Regarding claims 11 and 32, the modified system of Doucet, Koyama and Amadon differs from the claimed invention in that Doucet, Koyama and Amadon do not specifically teach that the system includes collimating the beam of light with a gradient index lens. However, a gradient index lens is well known in the art, and using a gradient index lens to collimate a beam of light is also well known in the art. For example, Meadows discloses to collimate a light beam using a gradient index lens (column 3, lines 47-55). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use a gradient index lens to collimate the beam of light, as it is taught by Meadows, in the modified system of Doucet, Koyama and Amadon in order to direct the beam of light to a receiver with sufficient light intensity.

8. Claims 18 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Doucet et al. (U.S. Patent US 5,786,923) in view of in view of Koyama et al. (F. Koyama et al., "1.5 W operation of superluminescent diode with highly strained GaInAs/GaAs quantum well emitting at 1.2 μm band"; IEEE 17th International Semiconductor Laser Conference Digest 2000, September 2000, Pages 71 – 72) and further in view of Yonenaga et al. (U.S. Patent US 5,543,952).

Regarding claims 18 and 39, as they are understood in view of the above 112 problems, the modified system of Doucet, Koyama and Amadon differs from the claimed invention in that Doucet and Koyama do not specifically teach to use an interferometer to toggle the light beam to at least one of on and off. However, it is well known in the art to toggle (modulate) the light beam using an interferometer. For example, Yonenaga discloses to modulate the intensity of the light beam to one of on and off using an interferometer (column 3, lines 52-67 and column 4, lines 1-2). Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to use an interferometer to toggle (modulate) the intensity of the light beam to at least one of on and off, as it is taught by Yonenaga, in the modified system of Doucet, Koyama and Amadon in order to encode the light beam.

Response to Arguments

9. Applicant's arguments filed on May 18, 2007 have been carefully considered but are not persuasive.

Applicant states, "Current FSOC systems use lasers as the means of emitting light from the source to the destination across free space." However, Doucet clearly, specifically, and explicitly discloses that the light source used for free space optical communication can be "lasers, a super-fluorescent light source, or other coherent and/or non-coherent light" (column 4, lines 47-56). Applicant argues that "Doucet makes no mention of using an LED, and provides no discussion of the advantages of using a phase-incoherent light source, nor does Doucet acknowledge that a long-range

FSOC link will exhibit scintillation which could be mitigated with phase-incoherent light." Examiner respectfully disagrees with Applicant. As mentioned above, and admitted by Applicant, Doucet does disclose that the light source for FSOC can be "non-coherent light". Although Doucet "makes no mention of using an LED", however it is a well known common knowledge that an LED is one possible source of "non-coherent light", therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate an LED, such as the one disclosed by Koyama, to generate the "non-coherent light", because LED is a well known and available "non-coherent light" source. Although Doucet "provides no discussion of the advantages of using a phase-incoherent light source", nor "acknowledge that a long-range FSOC link will exhibit scintillation which could be mitigated with phase-incoherent light", the modified FSOC of Doucet and Koyama **inherently** reduces the atmospheric scintillation, it does not matter whether the reduction of scintillation is acknowledged or not. In accordance with MPEP, "The discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." Atlas Powder Co. v. Ireco Inc., 190 F.3d 1342,1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999).

10. Applicant other arguments filed on May 18, 2007 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Swanson et al. (U.S. Patent US 5.062.150) teach a fiber-based free-space optical system using both coherent and incoherent optical system. Milano et al. (U.S. Patent US 5,870,215) disclose a compact infrared identification and communication assembly using incoherent infrared light.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571)

272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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